



॥ नवोन्मेषेण देश निर्माणम् ॥

భారతీయ సాంకేతిక విజ్ఞాన సంస్థ హైదరాబాద్
भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

Welcome to

IITH

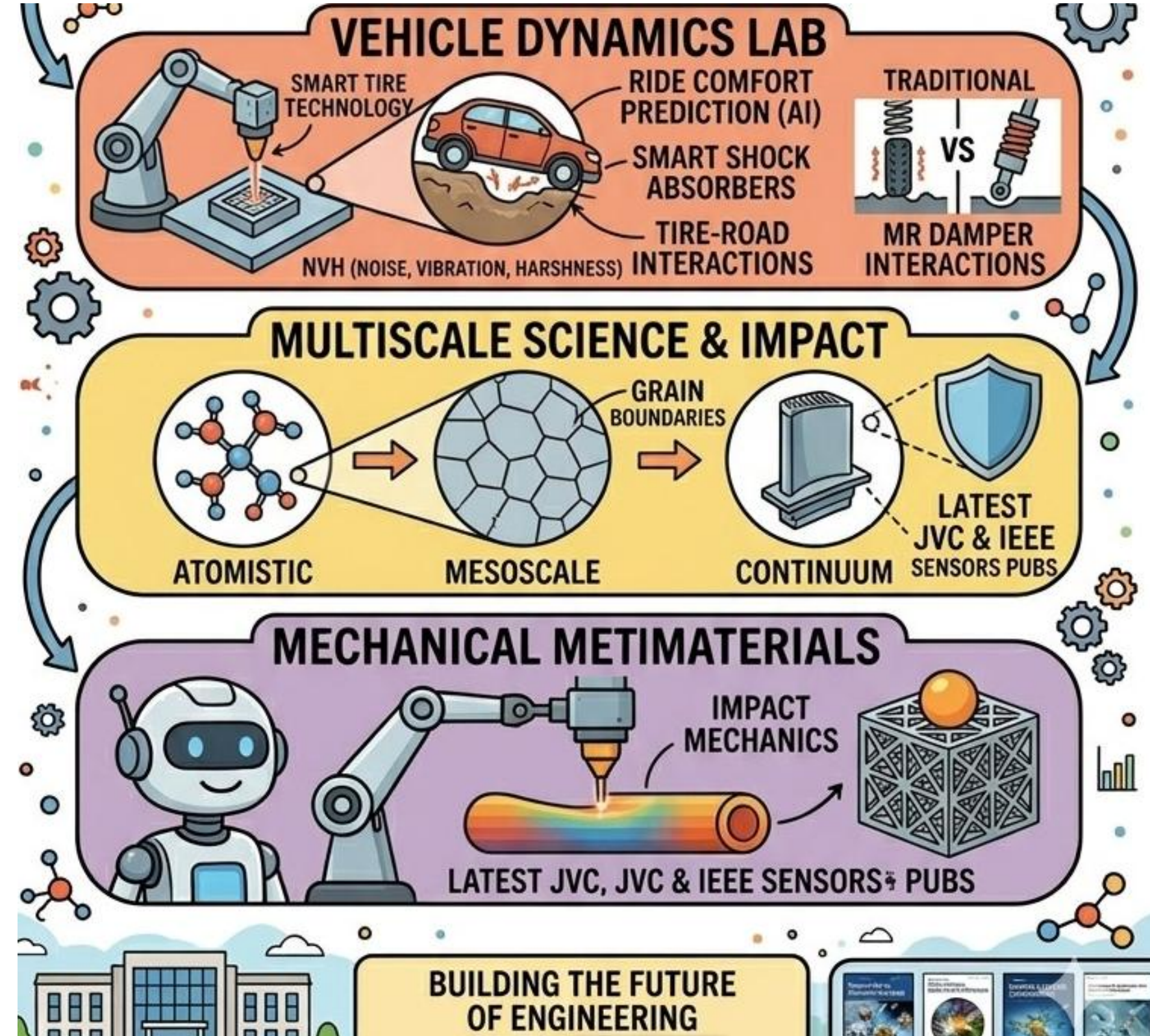
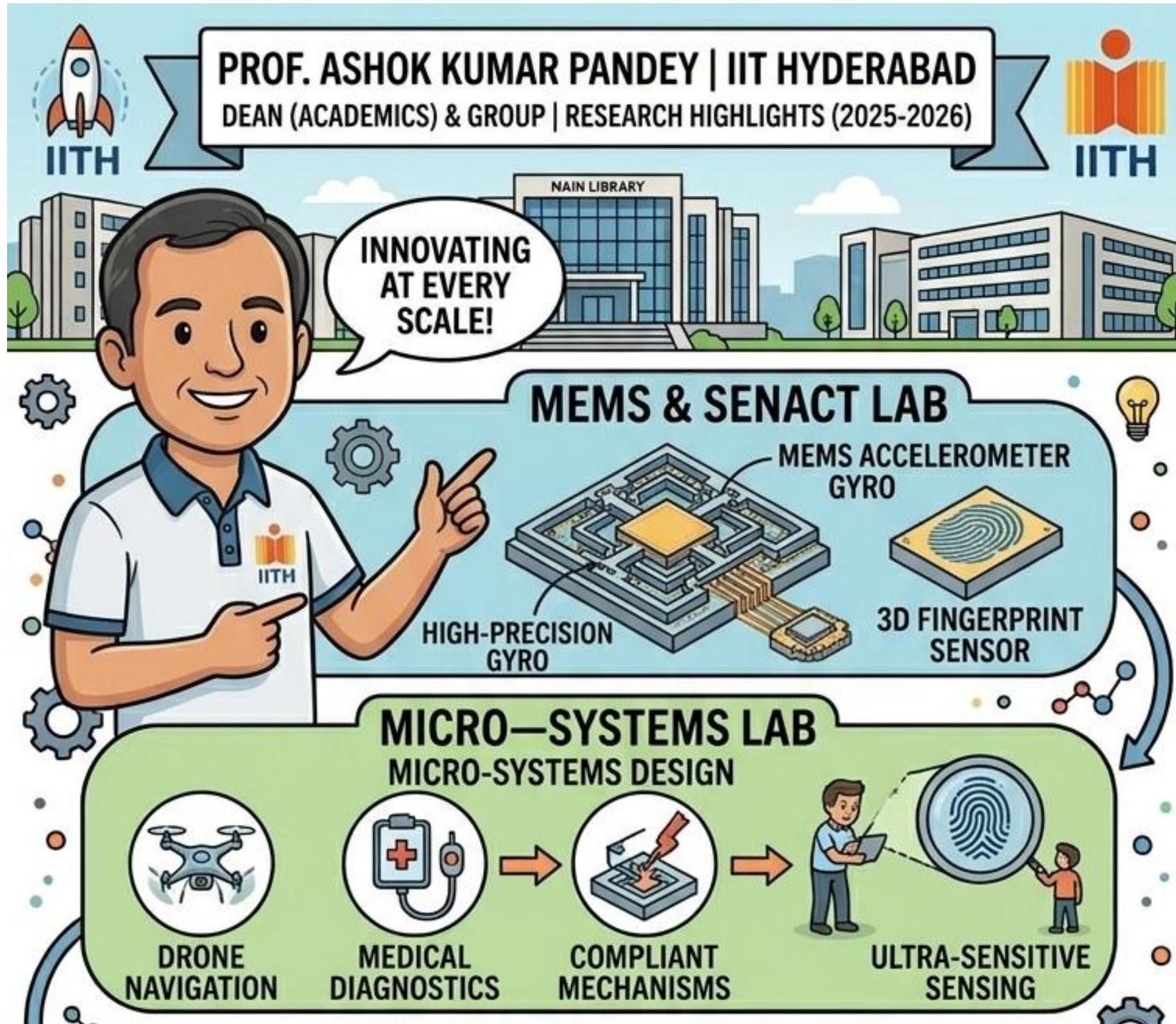
Innovate. Collaborate. Impact.



॥ नवोन्मेषेण देश निर्माणम् ॥

ఐఐటీ హైదరాబాద్
आई आई टी हैदराबाद
IIT Hyderabad

Who am I? What is my Portfolio?



Academic Programs and Research Thrust@IITH

Undergraduate Programs

Departmental Programs :

- Artificial Intelligence
- Biomedical Engineering
- Biotechnology and Bioinformatics
- Civil Engineering
- Chemical Engineering
- Computer Science & Engineering
- Electrical Engineering
- Electrical Engineering (IC Design & Technology)
- Engineering Science
- Industrial Chemistry
- Materials Science & Metallurgical Engineering
- Mathematics & Computing
- Mechanical & Aerospace Engineering
- Engineering Physics

Center for computational Engineering :

- Computational Engineering

Bachelors of Design

- BDes

Master of Science (MSc)

Chemistry

- Chemistry

Mathematics

- Mathematics
- Mathematics and computing

Physics

- Physics

CIP (Inter Disciplinary Program)

- Medical Physics(with Basavatarkam Oncology Inst.)

Regular MTech/MDes

Artificial Intelligence

- Artificial Intelligence

Biomedical Engineering

- Medical Sensing, Analytics & Simulation
- Nanomedicine & Biomaterials

Biotechnology

- Medical Biotechnology

Climate Change

- Climate Change

Civil Engineering

- Structural Engineering
- Environmental Engineering
- Hydraulic & Water Resource Engineering
- Geotechnical Engineering
- Transportation Engineering

Chemical Engineering

- Chemical Engineering

Computer Science and Engineering

- Computer Science & Engineering
- Network & Information Security

Design

- Visual Design
- Product Design
- Interaction Design

Electrical Engineering

- Communications and Signal Processing & Learning
- Microelectronics and VLSI
- Power Electronics and Power Systems
- Systems and Control

Entrepreneurship and Management

- Techno Entrepreneurship

Materials Science & Metallurgical Engineering

- Materials Science & Metallurgical Engineering
- Semiconductor Materials and Devices

Postgraduate Programs

Mechanical & Aerospace Engineering

- Mechanics and Design
- Integrated Design and Manufacturing
- Thermo-Fluid Engineering
- Aerospace Engineering
- Robotics and Intelligent Systems.

Physics

- Quantum & Solid State Devices

CIP (Center for Interdisciplinary Programs)

- Additive Manufacturing (with DRDO)
- Medical Device Innovation (with AIG)
- Smart Mobility (with TiHAN)
- Ophthalmic Engineering (with LVPEI)
- Integrated Circuits and Microsystems Packaging
- Lightweight Engineering

GSS (Greenko School of Sustainability)

- Sustainable Engineering
- E-Waste Resource Engineering and Management (with CMET)
- Energy Science and Technology

Online MTech/MDes Programs

Computer Science and Engg.

- Data Science

Design

- MDes by Practice

Heritage Science and Technology

- Heritage Science and Technology

Mechanical and Aerospace Engg.

- Computational Mechanics

Materials Science and Metallurgical Engg.

- Industrial Metallurgy

CIP(Inter Disciplinary Program):

- Integrated Computational Materials Engineering
- EV Technology

Master of Arts (MA)

Liberal Arts

- Development Studies
- Health, Gender & Society

PhD Disciplines

Departmental Programs :

- Artificial Intelligence
- Biomedical Engineering
- Biotechnology
- Chemical Engineering
- Chemistry
- Civil Engineering
- Climate Change
- Computer Science & Engineering
- Design
- Electrical Engineering
- Engineering Science
- Entrepreneurship and Management
- Heritage Science and Technology
- Liberal Arts
- Materials Science & Metallurgical Engineering
- Mathematics
- Mechanical & Aerospace Engineering
- Physics
- Center for Interdisciplinary Programs
- Greenko School of Sustainability

Interdisciplinary Program :

- Artificial intelligence, computing, communications & networks
- Bioengineering & Healthcare
- Energy, environment, creative design & Management
- Novel materials & computational techniques
- Soft and Active Matter & Mechanics of materials

Our Thrust Areas



Autonomous Navigation/Smart Mobility



5G & Next Generation Communication Technologies



Advanced Materials / Critical Minerals



Semiconductors / Sensors and Devices



Medical Technology / Health Care



Additive Manufacturing



Climate Change and Sustainability



Transportation



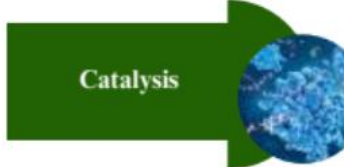
Integrated Computational Engineering



Artificial Intelligence



Nano-Technology



Catalysis



Energy



Robotics



Waste to Wealth Management

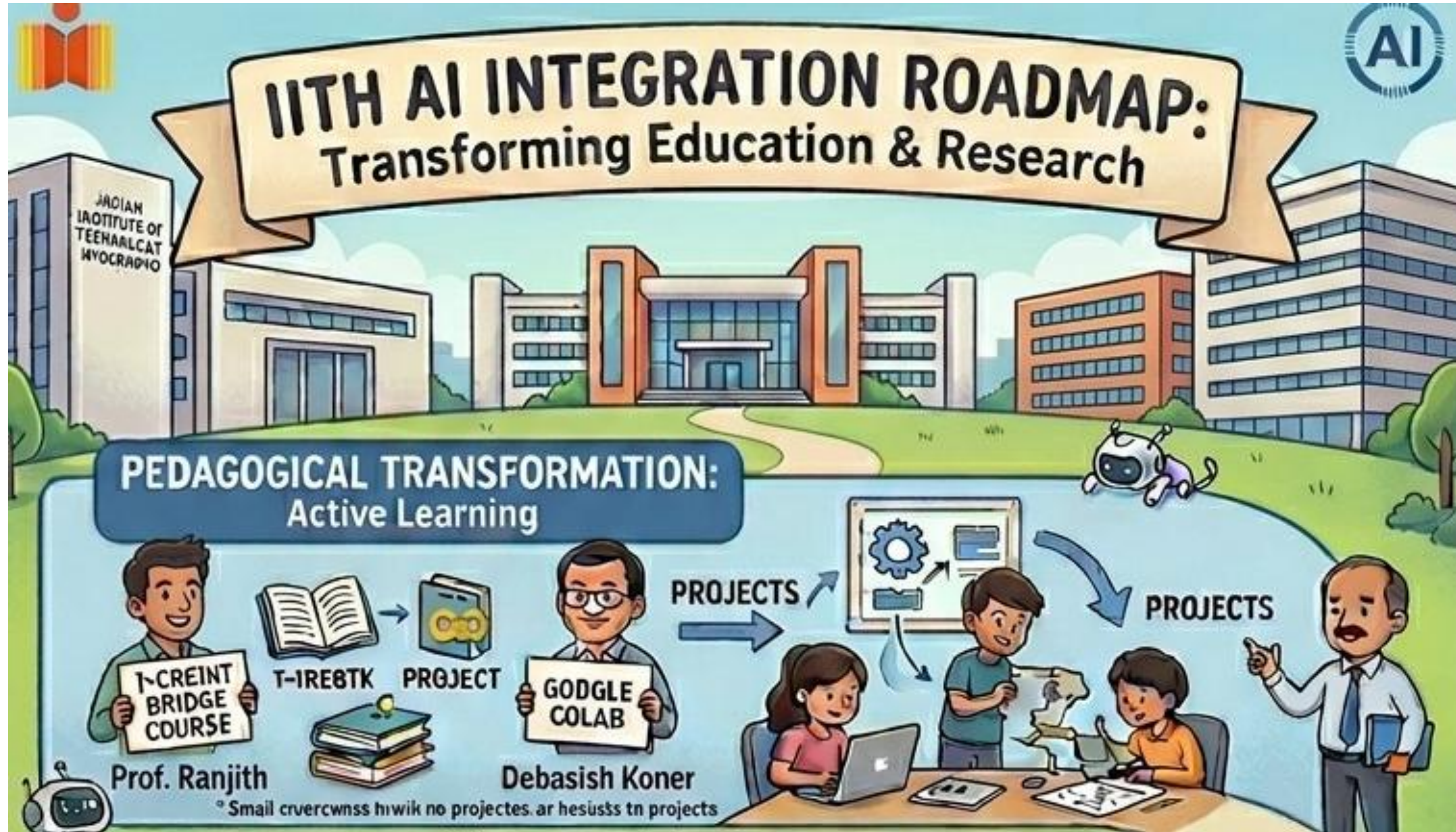


Design Thinking and Innovation

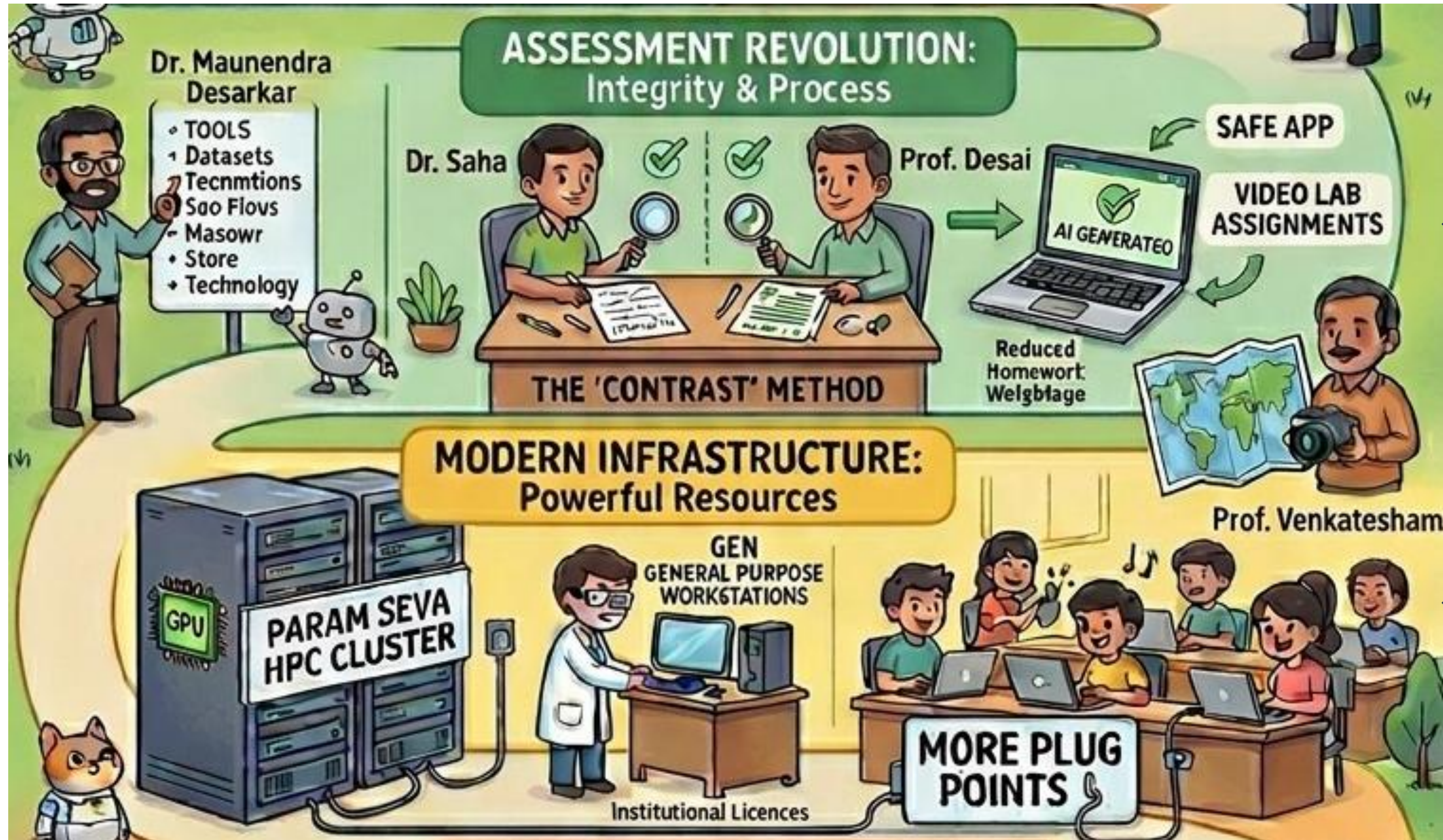


Rural Development

Academic Innovation: Integrated Education



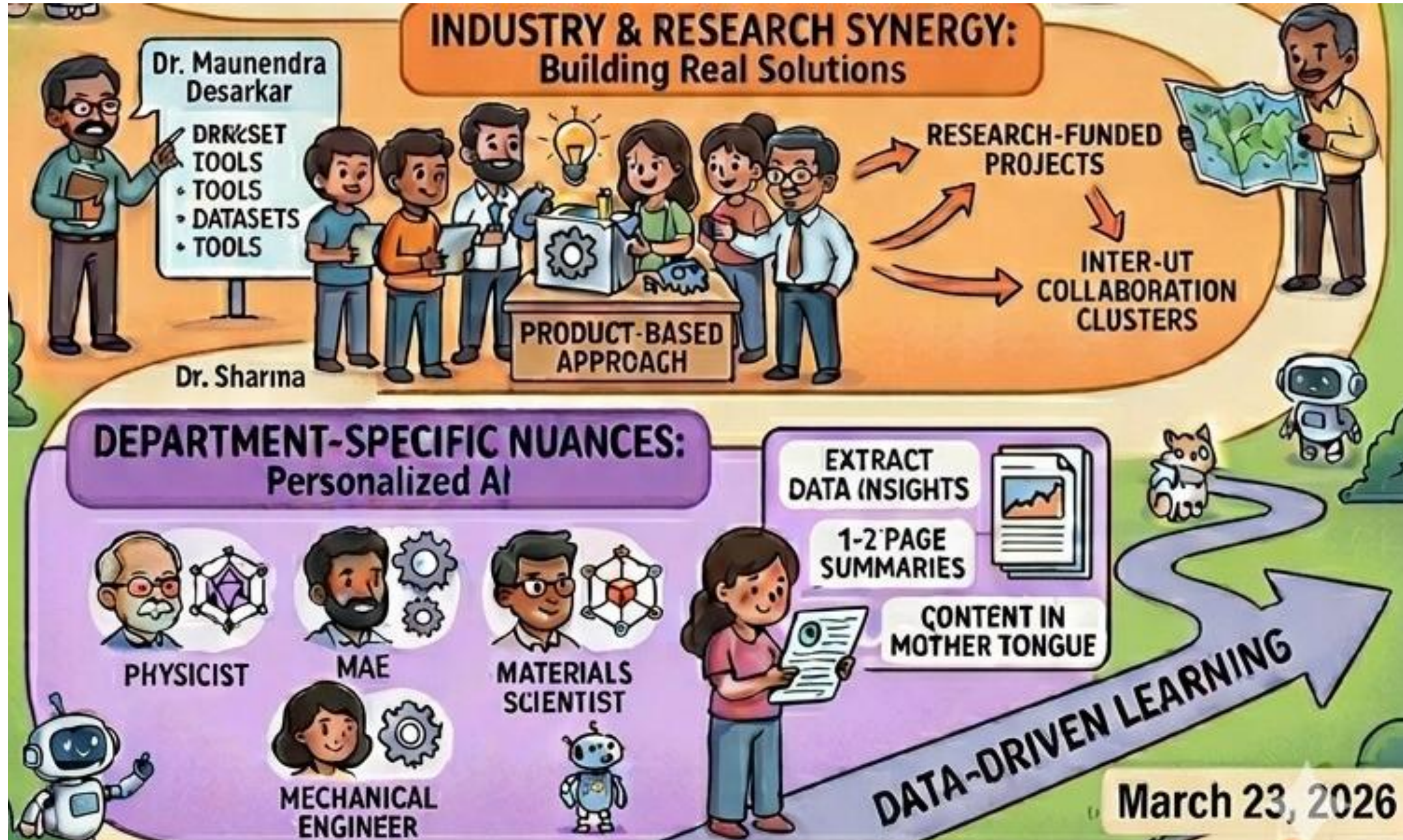
Academic Innovation:



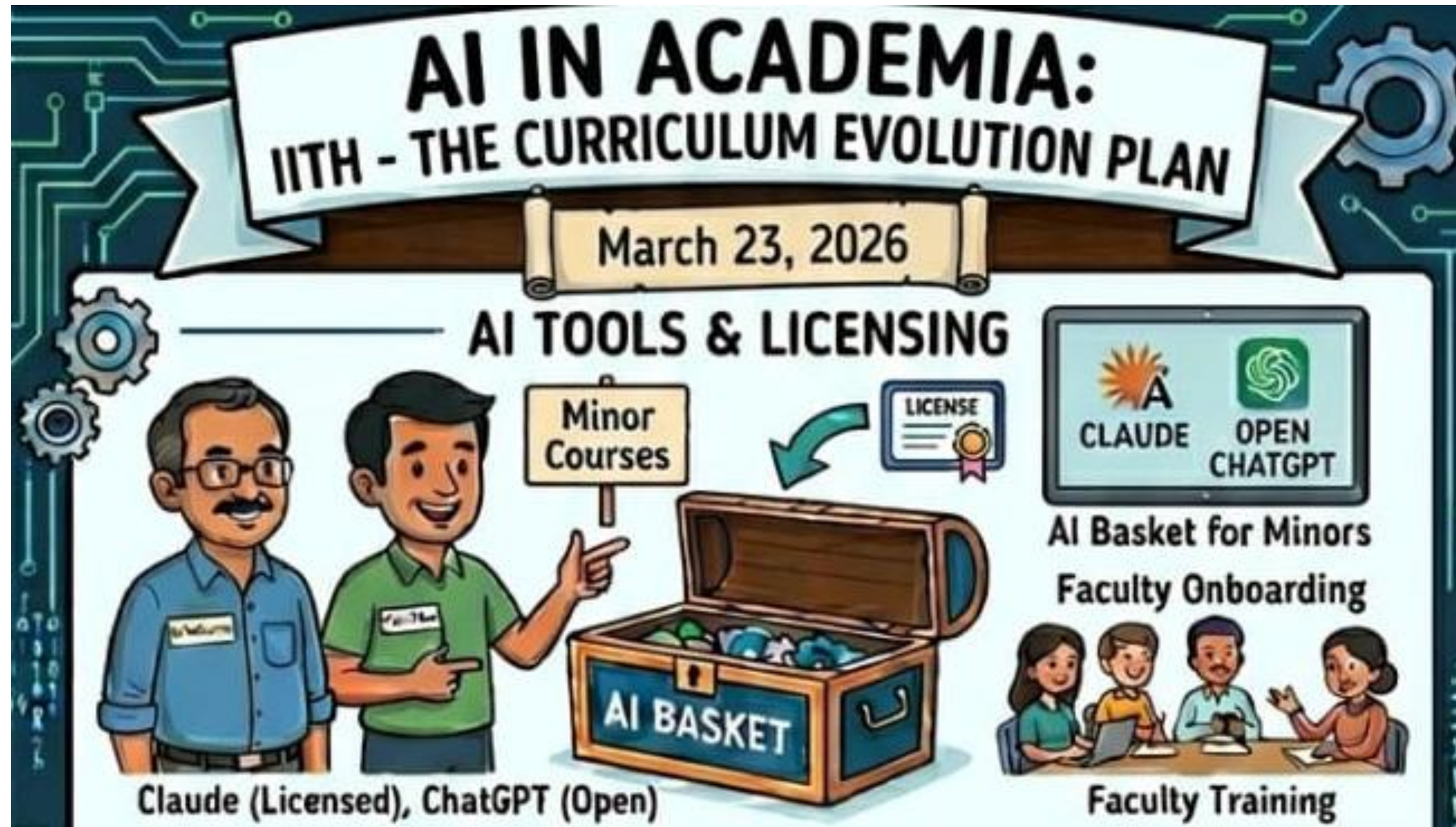
Dean (Acad)

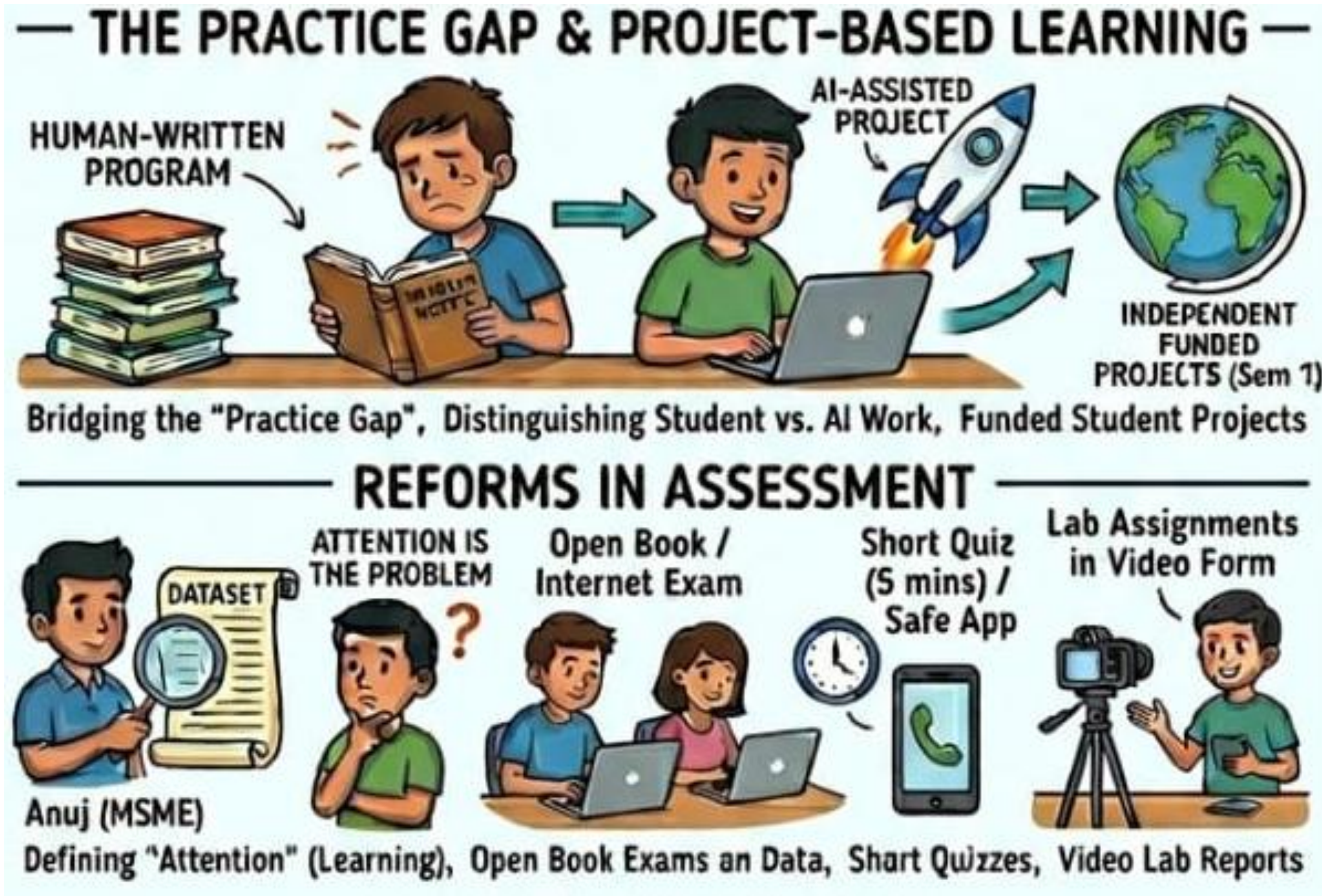
Dean (DT)

Academic Innovation:

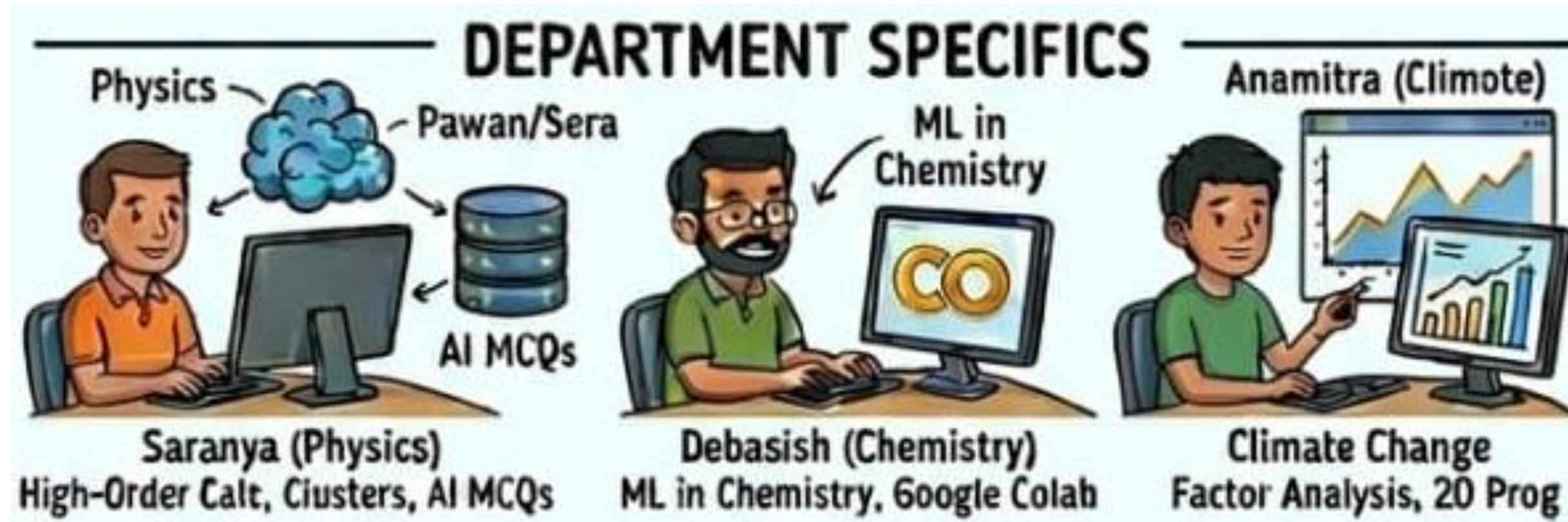


Academic Innovation: AI Evolution Plan





Academic Innovation:



OBJECTIVES



Academic Innovation: Example



STUDENT PERFORMANCE ANALYSIS

COMPREHENSIVE ANALYSIS OF ASSESSMENTS (TOTAL: 100 MARKS)

**SEMESTER:**
Jan–April 2026

**COURSE CODE:**
ME5670

**COURSE TITLE:**
Vehicle Dynamics & Modeling

**INSTRUCTOR:**
Dr. Ashok Kumar Pandey

QUIZ-1, IIT HYDERABAD

ME 5670 – Vehicle Dynamics

Date: 29/01/2026

Maximum Marks – 15

Time duration: 1.5 hours

Instructions:

- All questions are compulsory.
- Only calculators are allowed in the examination room.

1. Answer the following questions:

Marks: XXXX

- Draw the vehicle and tire coordinate systems and mention the corresponding degrees of freedom.
- For a vehicle moving on an inclined plane, obtain the relationship of acceleration and deceleration in terms of CG of the vehicle. Also, find the condition for selecting the front/rear wheel driving/braking for optimal driving and braking force.
- For a rigid body motion, write the equation of motion in terms of quantity defined in body fixed coordinate rotating with an angular velocity to capture 6-DoF motion. Subsequently, obtain the relationship of angular velocity of rotating coordinates in terms of roll, yaw and pitch angles through co-ordinate transformation.
- For planar coming motion of a tricycle with given position and velocity, obtain the governing equation in terms of vehicle parameters. Subsequently, obtain the relationship of vehicle and tire coordinates in terms of states of CG of the vehicle.

**INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD**
Department: MPE
Mid Semester ☐ End Semester ☐
STUDENT'S NAME: _____
Programme: B.Tech
Course No.: _____ Course Title: _____

Question No.	1	2	3	4
MARKS	2	2	5	2

b)

with friction μ_x ,
 $f_{x1} = \mu_x f_{z1}$ $f_{x2} = \mu_x f_{z2}$

$\therefore 2\mu_x (f_{z1} + f_{z2}) = m a_x + m g \sin \theta$
 $= 2\mu_x m g \cos \theta = m a_x + m g \sin \theta$
 $\therefore a_x = g \mu_x \cos \theta - g \sin \theta$ maximum acceli

Front wheel drive
 $f_{x2} = 0$
 $2\mu_x f_{z1} = m a_{\text{fwd}} + m g \sin \theta$
 $= \mu_x \left(\frac{a_2}{l} m g \cos \theta - \frac{h}{l} m g \sin \theta - m g \frac{h}{l} \sin \theta \right) = (m a_{\text{fwd}} + m g \sin \theta)$
 $a_{\text{fwd}} = \frac{\mu_x a_2 g \cos \theta - \frac{h}{l} g \sin \theta - g \frac{h}{l} \sin \theta}{1 + \frac{h}{l}}$
 $a_{\text{fwd}} \left(1 + \frac{h}{l} \right) = \mu_x \frac{a_2}{l} g \cos \theta - g \frac{h}{l} \sin \theta - g \sin \theta$
 $\left(\frac{a_{\text{fwd}}}{g} \right) = \frac{\mu_x \frac{a_2}{l} \cos \theta - \frac{h}{l} \sin \theta - \sin \theta}{1 + \frac{h}{l}}$
Similarly,
 $\left(\frac{a_{\text{rud}}}{g} \right) = \frac{\mu_x \frac{a_1}{l} \cos \theta + \frac{h}{l} \sin \theta - \sin \theta}{1 - \frac{h}{l}}$
These are the conditions for optimal drive with fwd / rud.
It is primarily based on $(a_2 \text{ and } a_1)$, i.e., position of CG.

max acceleration $a_x > 0$,
 $F_{z1} = 0$
 $\Rightarrow \frac{1}{2} \frac{a_2}{l} m g \cos \theta - \frac{1}{2} \frac{h}{l} m a_x - \frac{1}{2} m g \frac{h}{l} \sin \theta = 0$
 $\Rightarrow a_2 g \cos \theta - h a_x - g h \sin \theta = 0$
 $a_x = \frac{a_2}{h} g \cos \theta - g \sin \theta$
max deceleration $a_x < 0$,
 $F_{z2} = 0$
 $\Rightarrow a_1 g \cos \theta + h a_x + g h \sin \theta = 0$
 $a_x = -\left(\frac{a_1}{h} g \cos \theta + g \sin \theta \right)$

AI Implementation in VD Course: A Case Study



STUDENT PERFORMANCE ANALYSIS



COMPREHENSIVE ANALYSIS OF ASSESSMENTS (TOTAL: 100 MARKS)



SEMESTER:
Jan–April 2026



COURSE CODE:
ME5670



COURSE TITLE:
Vehicle Dynamics & Modeling



INSTRUCTOR:
Dr. Ashok Kumar Pandey

COMPARISON ANALYSIS: QUIZ-1 & QUIZ-2 (MANUAL vs AI EVALUATION)

STATISTICS	QUIZ-1 (15)			QUIZ-2 (15)		
	MANUAL	AI	DIFFERENCE (AI – MANUAL)	MANUAL	AI	DIFFERENCE (AI – MANUAL)
CLASS AVERAGE	8.42	9.34	+0.92	9.34	10.19	+0.85
AVERAGE ABSOLUTE DIFFERENCE	1.45			0.80		
STUDENTS WHERE AI > MANUAL	15 (78.9%)			14 (73.7%)		
STUDENTS WHERE AI = MANUAL	3 (15.8%)			3 (15.8%)		
STUDENTS WHERE AI < MANUAL	1 (5.3%)			2 (10.5%)		
HIGHEST POSITIVE DIFFERENCE	+3.5			+2.5		
HIGHEST NEGATIVE DIFFERENCE	–0.5			–1.5		

KEY TAKEAWAYS (QUIZ-1 & QUIZ-2)



AI evaluation awarded higher marks in majority of cases in both quizzes.



Average difference (AI - Manual) is within ± 1 mark, indicating strong alignment.

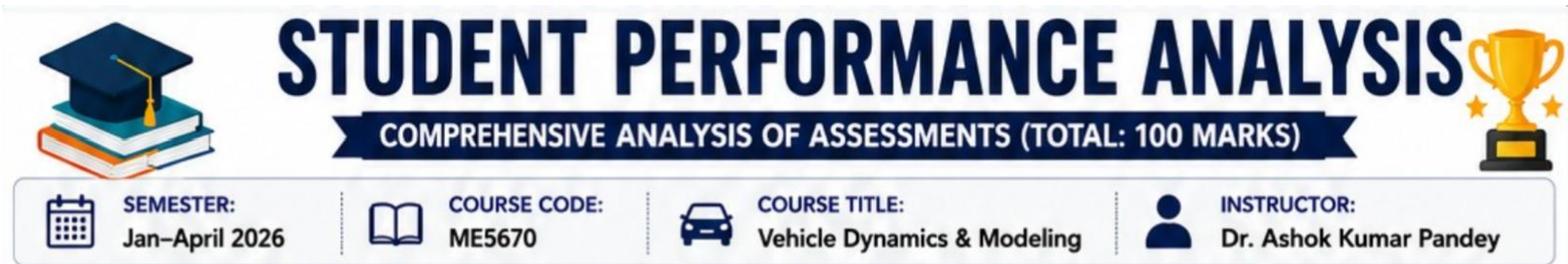


AI evaluation shows consistency and fairness with minimal deviation.



Differences are within acceptable range and do not affect overall academic decisions.

AI Implementation in VD Course: A Case Study



METRIC	QUIZ-4 (AI BASED)
CLASS AVERAGE (OUT OF 15)	9.54
MEDIAN SCORE	11.25
HIGHEST SCORE	13.50
LOWEST SCORE	4.50
STANDARD DEVIATION	2.48
SCORE $\geq$ 10 MARKS	11 (57.9%)
SCORE $<$ 7.5 MARKS	3 (15.8%)





INSIGHTS (QUIZ-4)



Quiz-4 was completely generated and evaluated using AI (OpenAI).



Students performed well with an average of 9.54/15 (63.6%).



Majority of students scored in the 9–12 range.



AI evaluation ensured objectivity, consistency and detailed rubric-based grading.

 Quiz-3 is evaluated manually only (Average: 9.68 / 15)

Quiz-4 is completely AI based (generation + evaluation).

AI Implementation in Vehicle Dynamics Course: A Case Study



STUDENT PERFORMANCE ANALYSIS

COMPREHENSIVE ANALYSIS OF ASSESSMENTS (TOTAL: 100 MARKS)



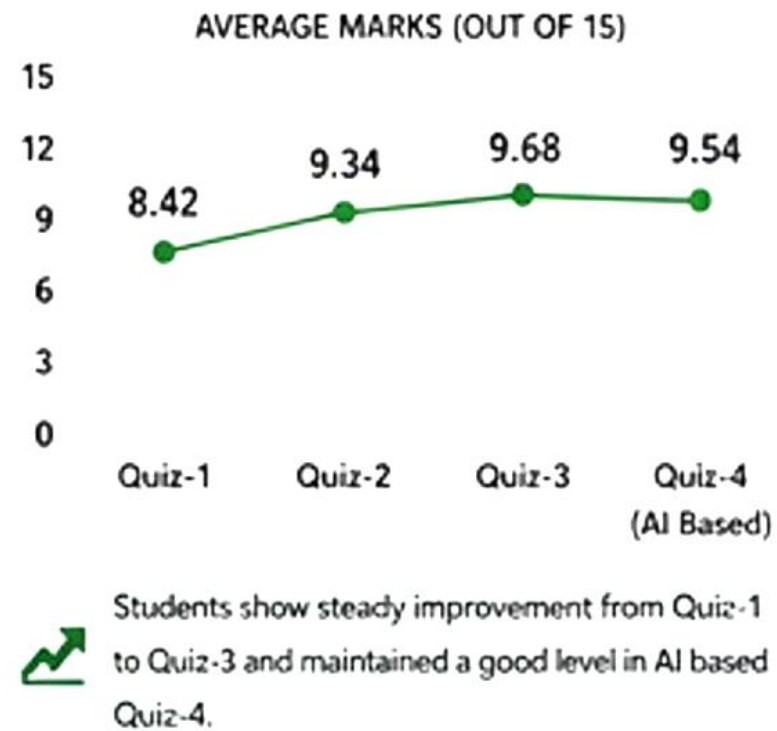
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**COURSE TITLE:**
Vehicle Dynamics & Modeling

**INSTRUCTOR:**
Dr. Ashok Kumar Pandey

LEARNING TREND (QUIZZES)



STRENGTHS & AREAS TO IMPROVE

- 

STRENGTHS (Strong Areas)

 - ✓ Projects
 - ✓ Assignments
 - ✓ Applied / Practical Learning
 - ✓ Continuous Assessment Participation
- 

AREAS NEEDING IMPROVEMENT

 - Early conceptual quizzes
 - Consistency in timed assessments
 - Some students showed sharp variation between quizzes

STUDENT PERFORMANCE CATEGORIES

- 

HIGH ACHIEVERS (80+)

Consistently performed well across quizzes, maintained high assignment scores, and excelled in projects.

5 STUDENTS
- 

STABLE PERFORMERS (70–79)

Majority of students fall here. Good understanding with moderate inconsistency in quizzes.

8 STUDENTS
- 

AT-RISK / IMPROVEMENT (<65)

Weak quiz performance, lower consistency, reduced conceptual retention.

6 STUDENTS
- ### SUGGESTED SUPPORT

 - More formative quizzes
 - Practice-oriented problem solving
 - Concept revision sessions
 - Personalized guidance

OVERALL SUMMARY

- 

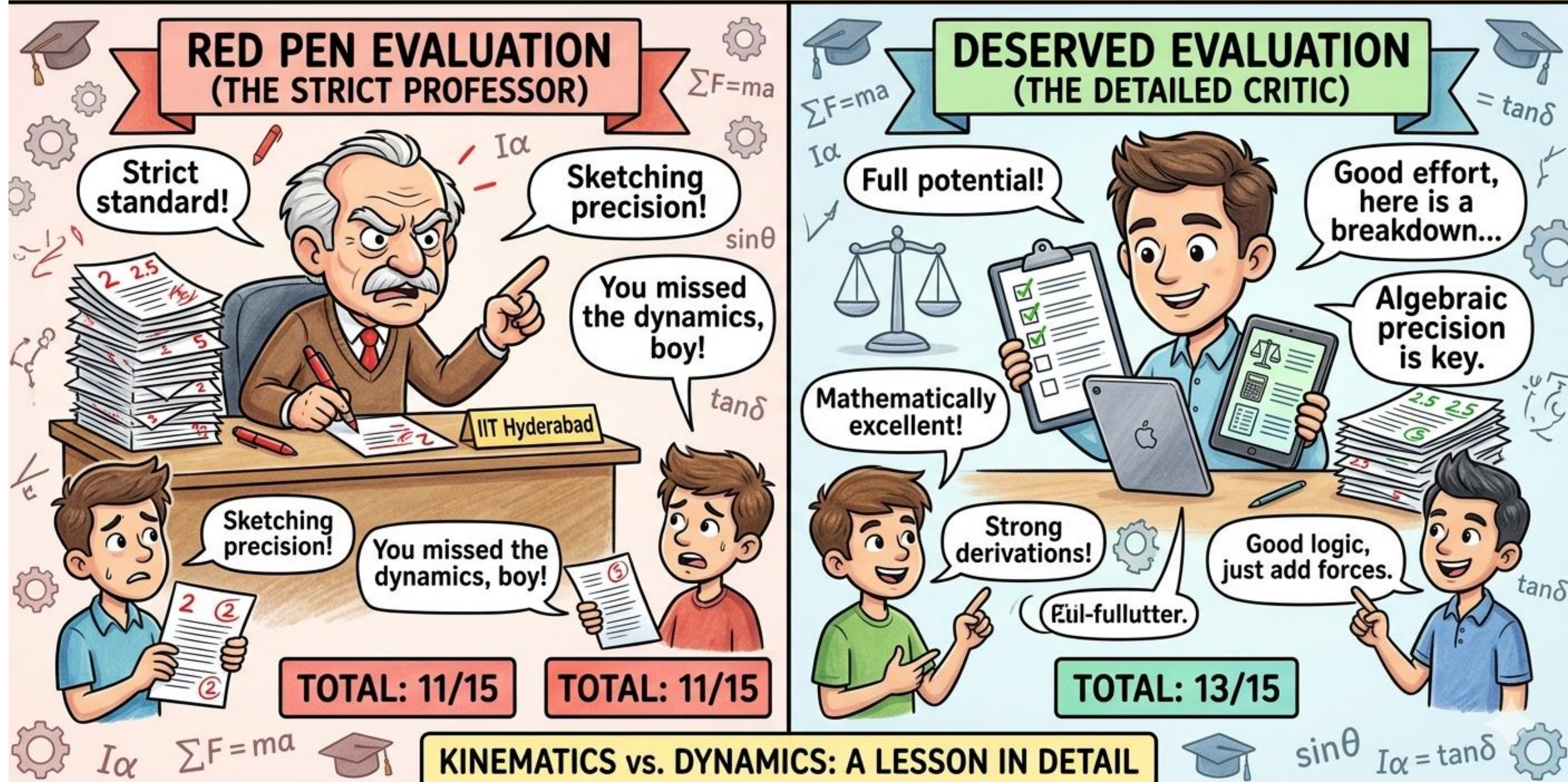
Overall class performance is strong and balanced.

Students excel in application-based and practical components compared to timed quizzes.

AI based evaluation shows high alignment with manual grading and supports objective, consistent assessment.

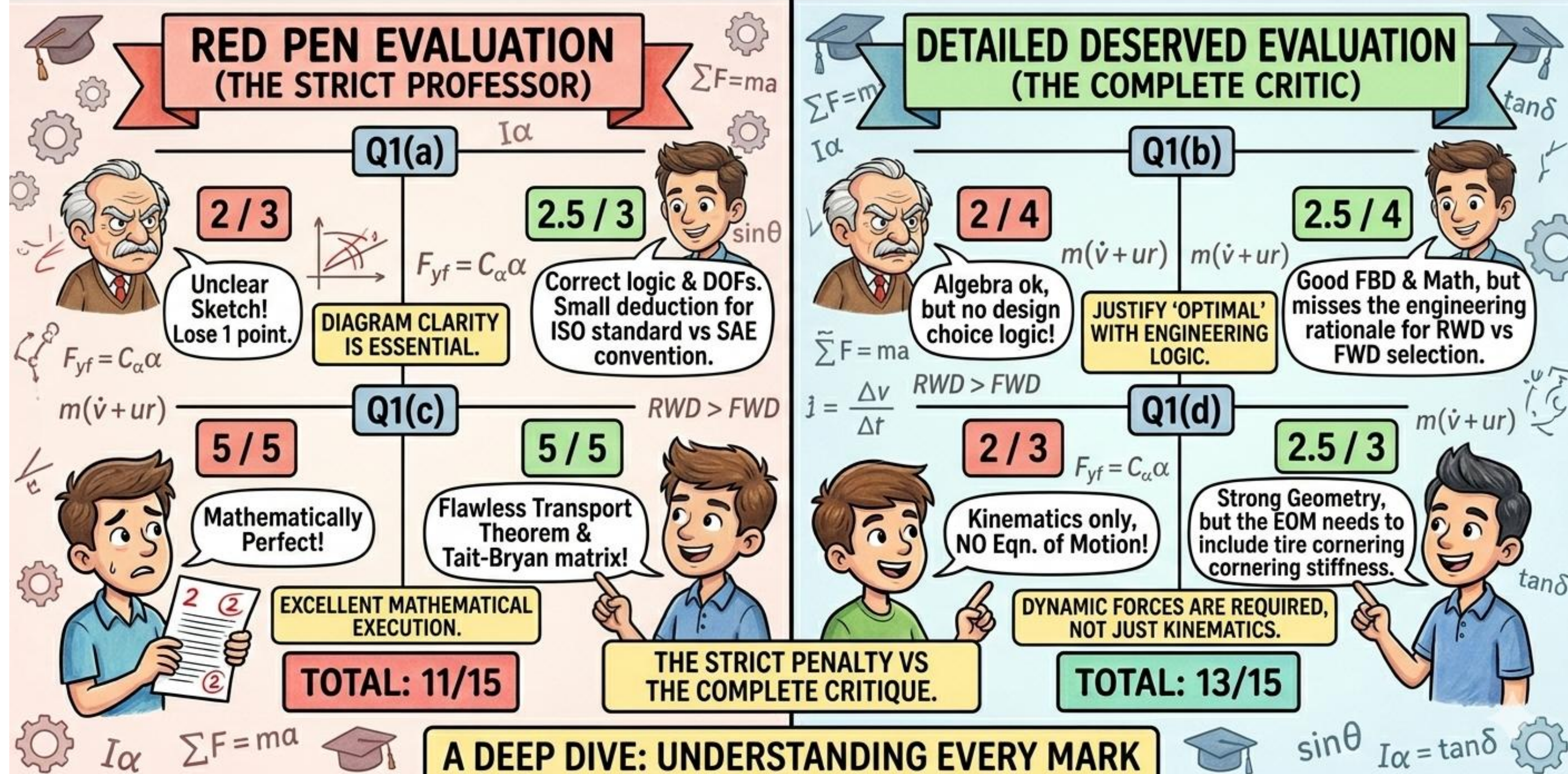


ME 5670 VEHICLE DYNAMICS: A COMPARATIVE EVALUATION POSTER

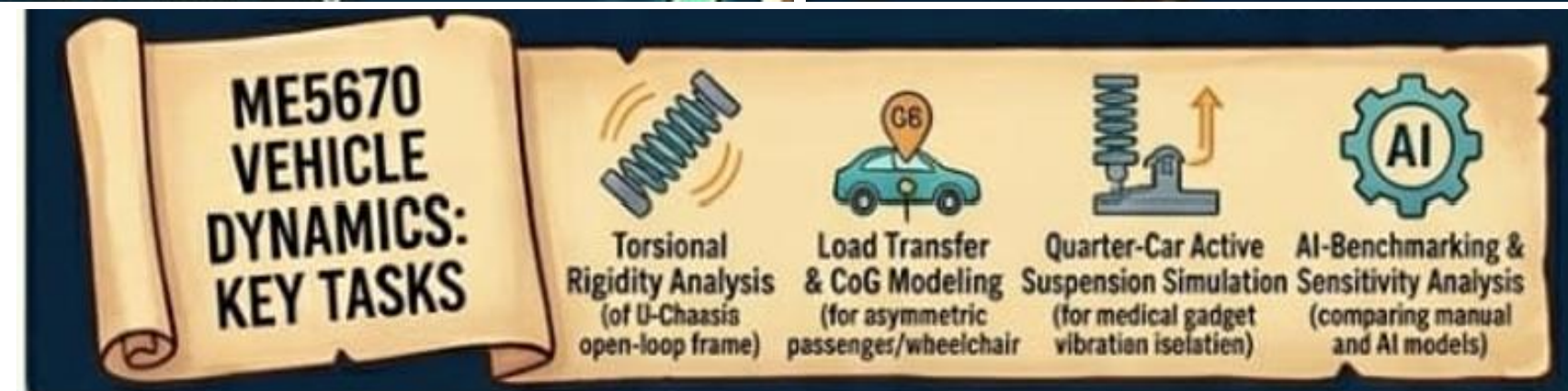
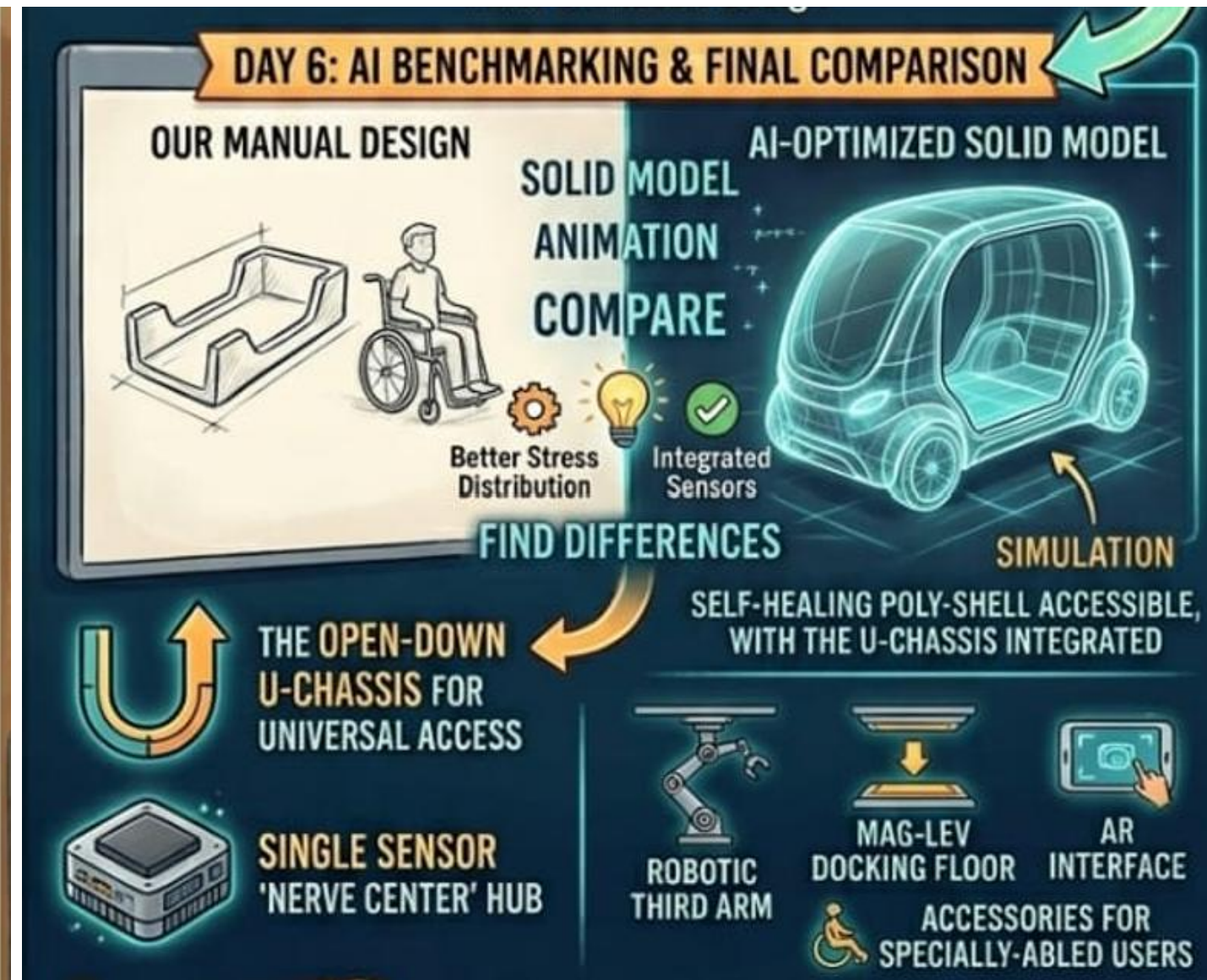


Academic Innovation: Comparison with AI Evaluation

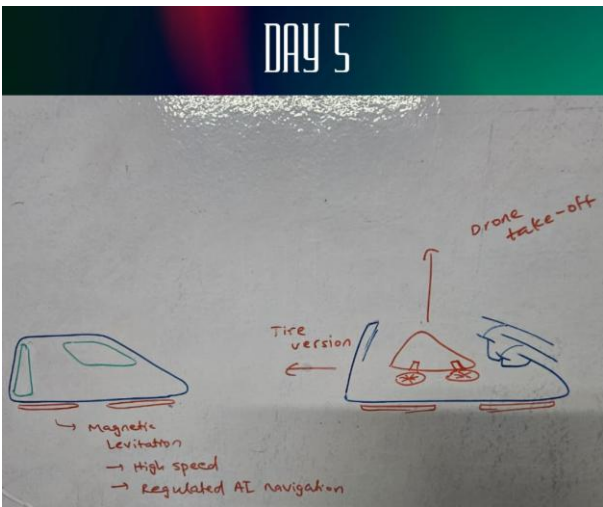
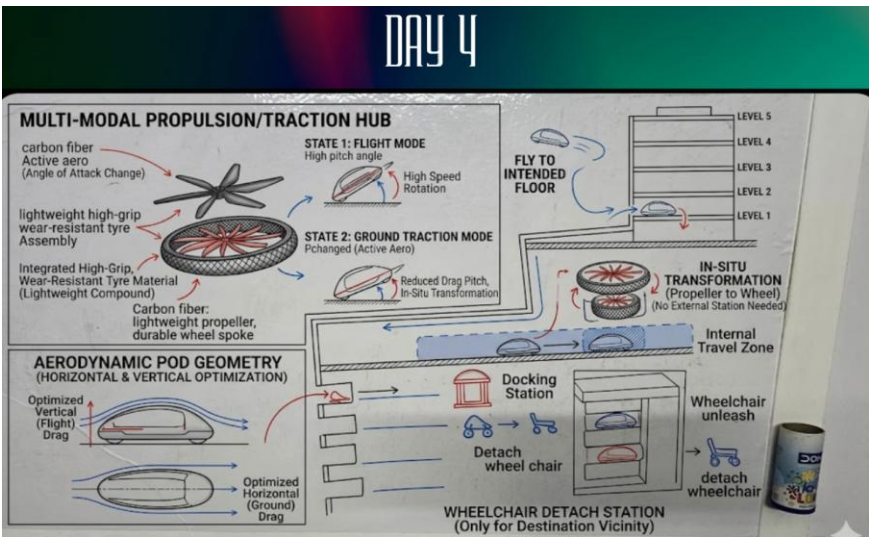
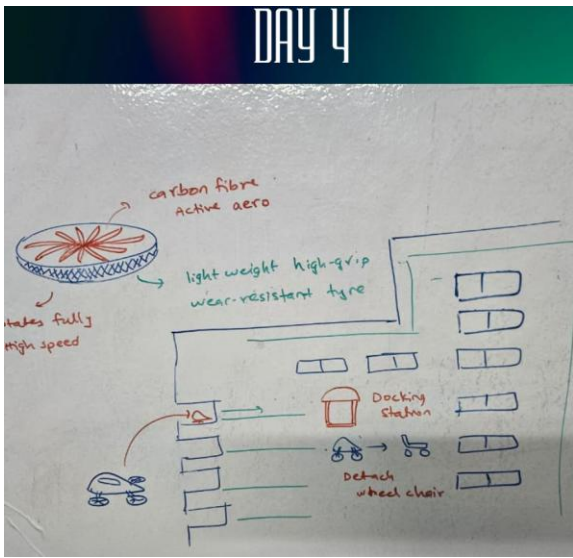
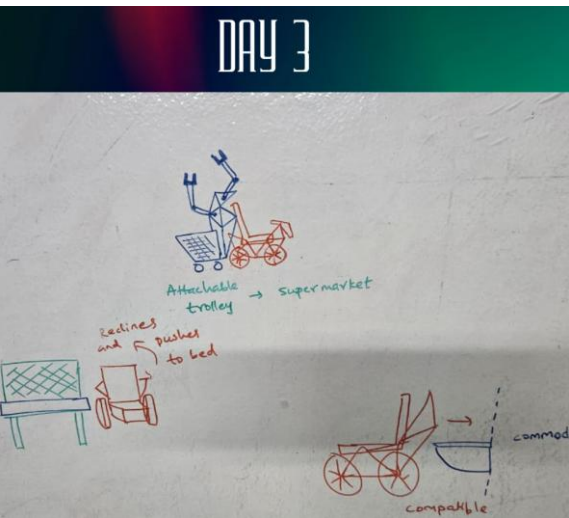
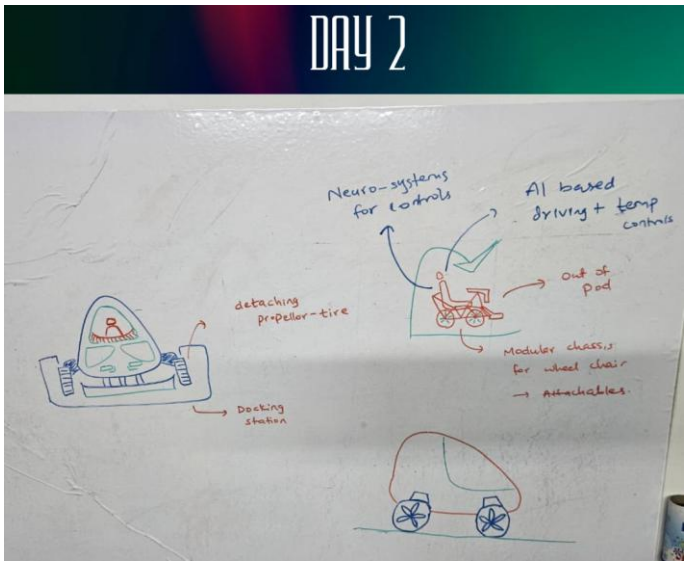
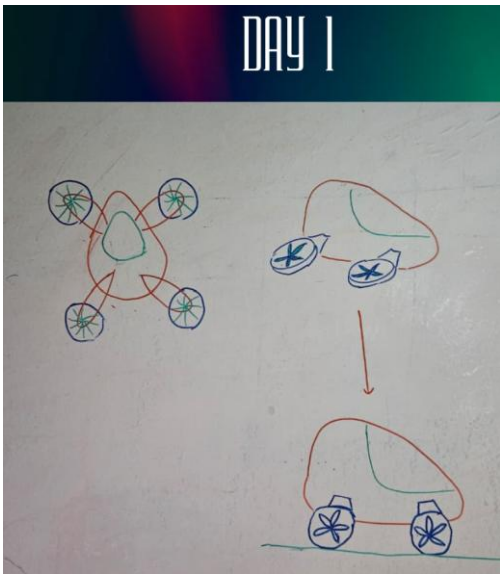
ME 5670 VEHICLE DYNAMICS: FULL QUESTION COMPARISON POSTER



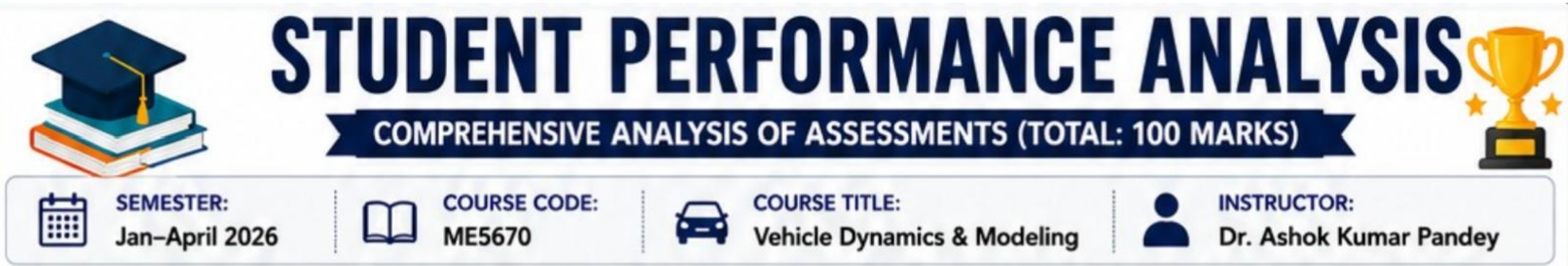
Hackathon Example



Hackathon Example



AI Implementation in Vehicle Dynamics Course: A Case Study



Ethics and Integrity

1. What is Research Integrity?



2. Why Integrity Matters in High-Impact Journals



3. Ethical Standards in Publishing



4. Challenges in High-Impact Publishing



Best Practices in Science

5. Best Practice Frameworks

COPE
Publication Ethics

Publisher Policies
Wiley & PLOS



6. Tips for Authors



7. Final Takeaway



Courtesy: ChatGPT



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THANK YOU

